Maryland Inland Fisheries Geographic Inland Fisheries Survey System (GIFS)

Background

In order to fulfill its responsibility to manage, restore and enhance Maryland's freshwater resources, MDNR's Inland Fisheries Division has been improving its data and information management system. In 1999 a Microsoft Access database was developed to assimilate Inland Fisheries data from all regions of the state. Prior to this data resided with the Regional Offices and were inconsistent in format and storage media.

In 2004 Inland Fisheries enlisted help from MDNR's Information Technology (IT) program to develop an improved data management system. The goal was to create a centrally housed storage system which could be accessed from Inland field offices across the State, with data summary and reporting capabilities, improved efficiency and accuracy of data entry, and with the capability of geographically projecting and querying data (GIS). The resulting system, referred to as the Geographic Inland Fisheries Survey system (GIFS) is built on Microsoft SQL Server technology and includes an ESRI MapObjects component to facilitate GIS mapping capability. MapObjects allows the user to view a base map with features such as roads, shorelines, and watershed boundaries. The database uses a typical Windows interface accessible to the field offices over the DNR network, and is centralized in Annapolis

The GIFS system is designed to incorporate nearly all standardized aquatic surveys performed by the Inland Fisheries staff. This includes streams, inland and tidal rivers, and freshwater impoundments. Data fields are organized into finfish, invertebrate, water quality and physical habitat tables. In addition, the GIFS system provides a way to export a "snapshot" of the data to an Access database for querying on local PCs. Routine query functions were developed in Microsoft .NET, through a grant from Multi-state Aquatic Resources Information System (MARIS). This application provides efficient, standardize calculation of population metrics such as CPUE, PSD, length-frequency histograms, macroinvertebrate indices, stream standing crop density estimates and tidal bass summaries. It also facilitates multiple-pass population estimates.

GIFS site data are organized by the MDE 8-digit watershed designations. The MDE 8-digit watersheds use a name and an 8-digit coding number to identify each watershed. For instance an 8-digit name is "Deep Creek Lake" and the number is coded 05020203. This is similar to the HUC codes but not identical.

Current Status

GIFS was made available at Inland regional offices in January of 2008. Historic data, including some records back to 1975 were imported from the original Access database. However use of MDE 8-digit system has required reorganization of sites and related data. This job is approximately 80% complete. An intern hired through an American Fisheries Society Computer User Section grant has been invaluable in organizing and verifying much of these historic data. A data gap between 2005 and 2008 exist due to the unanticipated protracted development time of the system. Staff is currently entering data starting with the 2007 surveys and working back through 2005. Table 1 illustrates the progress made with data entry and validation of existing data.

Funding

Work relating to this project is partly funded through Federal Aid, project F-48-R-17, Management of Fisheries Information Resources. Additional funding was provided through MARIS to help with development of the GIFS. MARIS multi-state cooperative organization that acts as a clearinghouse for fisheries information shared and accessed on the Internet. MARIS administered Federal grant money provided a programmer to develop the Microsoft .NET application as well and others system developement. In exchange, Maryland Inland Fisheries is supplying data to the MARIS system.

Refinements and Future Development

Updates and refinements to the GIFS database system continue. Additional query parameters will be added to the Microsoft .NET Framework application in spring of 2008 under an extension of the AFS grant. There is a need for more development of this product to automate more of the analyses performed by regional biologists. However, the current development grant is concluding. Inland Fisheries will need to budget for a multi-year grant to fully develop this application. This product may eventually be developed to provide information to the public as well via the web.

The GIS capabilities of the embedded MapObjects program are very limited. Current technology has already advanced beyond this module. More current ArcGIS software and training were provided to staff. However, a dedicated position is needed within Inland Fisheries in order to enhance GIS mapping capability and to guide development of this facet of the GIFS database.

Database and network infrastructure will need to be continually improved. Currently, long delays in entering and retrieving data over the DNR network is a major frustration for the biologist in the field. Quality control and data validation functions must also be improved in the GIFS system. These functions are achieved through the use of user 'Warning' and 'Dropdown' menus within the input interface. Actual checks of data values in many fields only occur through use of frequency tables and similar data summary procedures.

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Table 1. MD DNR Geographic Inland Fisheries Survey (GIFS) data entry progress, 2007.

	Pre 1975	1975-80	1981-85	1986-90	1991-95	1996-2000	2001	2002	2003	2004	2005	2006	2007
Western Region-D1													
Lakes	NA	NDE	NDE	NDE	NDE	PNV	NDE	PNV	NDE	NDE	NDE	NDE	PV
Streams	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE
Rivers	NDE	NDE	NDE	NDE	PNV	PNV	NDE	NDE	NDE	NDE	NDE	PV	CV
Invertebrates	NA	NDE	NDE	CNV	CNV	CNV	CNV	CNV	CNV	PNV	NDE	NDE	NDE
Tournaments	NA	NA	NA	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	PV	PV
Western Region-D2													
Lakes	NDE	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	NDE	NDE	NDE	PV
Streams	NDE	NDE	NDE	PNV	PNV	PNV	PNV	NDE	NDE	NDE	NDE	PV	CV
Rivers	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PV	PV	PV
Invertebrates	NA	CNV	PNV	PNV	PNV	CNV	CNV	CNV	PNV	PNV	NDE	NDE	PV
Tournaments	NA	NA	NA	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE
Central Region													
Lakes	NDE	NDE	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	NDE	NDE
Streams	NDE	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	PNV	NDE	NDE	PV
Rivers	NDE	NDE	NDE	NDE	PNV	PNV	PNV	NDE	NDE	PNV	NDE	NDE	NDE
Invertebrates	NA	CNV	CNV	CNV	CNV	CNV	CNV	CNV	NDE	NDE	NDE	NDE	NDE
Tournaments	NA	NA	NA	NA	NDE	NDE	NA	NA	NA	NA	NA	NA	NA

PV = Partial Data with Validation
PNV = Partial Data without Validation
CV = Complete Data with Validation
CNV = Complete Data without Validation
NDE = No data entered
NA = Not applicable

Table 1. MD DNR Geographic Inland Fisheries Survey (GIFS) data entry progress, 2007. (continued)

	Pre 1975	1975-80	1981-85	1986-90	1991-95	1996-2000	2001	2002	2003	2004	2005	2006	2007
Southern Region													
Lakes	NDE	PNV	PNV	PNV	PNV	PNV	PNV	PNV	NDE	PNV	NDE	PV	PV
Streams	NDE	NDE	NDE	NDE	NDE	PNV	NDE	NDE	NDE	NDE	NDE	PV	PV
Tidal Rivers	NDE	NDE	NDE	NDE	NDE	PNV	PNV	PNV	PNV	PNV	PNV	PV	PV
Invertebrates	NA	NA	NA	NA	CNV	NA	NA	NA	NA	NA	NA	NA	NA
Tournaments	NDE	NDE	NDE	NDE	CNV	CNV	CNV	CNV	CNV	CNV	NDE	NDE	NDE
Eastern Region													
Lakes	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE
Streams	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	NDE	PNV	NDE	NDE	NDE
Tidal Rivers	NDE	NDE	NDE	NDE	NDE	PNV	PNV	PNV	PNV	PNV	NDE	PNV	NDE
Invertebrates	NA	NA	NA	NA	NA	CNV	CNV	CNV	NA	NA	NA	NA	NA
Tournaments	NDE	NDE	NDE	NDE	CNV	CNV	CNV	CNV	CNV	CNV	NDE	NDE	NDE

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